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(12) UK Patent Application (19) GB (11) 2 268 221 (13) A

(43) Date of A Publication 05.01.1994

(21) Application No 9310664.9

(22) Date of Filing 24.05.1993

(30) Priority Data

(31) 9213616 (32) 26.06.1992 (33) GB

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(51) INT CL<sup>5</sup>

E05B 63/14

(52) UK CL (Edition M)

E2A AARK A100 A101 A106 A160 A171 A420 A504  
A509

(56) Documents Cited

GB 2242702 A GB 2202267 A GB 2196382 A  
GB 2168105 A

(58) Field of Search

UK CL (Edition L) E2A AAK AAR  
INT CL<sup>5</sup> E05B, E05C

(54) Multi-point lock

(57) A multi-point lock has a main lock unit 1 with a key-operated dead bolt 5 and remote bolt units 2 and 3 operated through a reciprocable drive linkage 7 by a handle (not shown) at the main unit 1. When the dead bolt 5 is thrown it interlocks with the linkage 7 to prevent retraction of the remote bolts also. The dead bolt 5 is itself blocked against forced retraction by a spring biased locking bar 29 within the main lock unit in addition to a conventional detainer 26.

Fig.1.

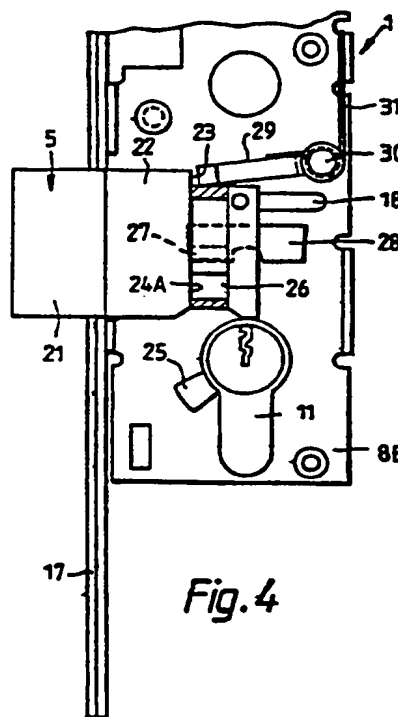
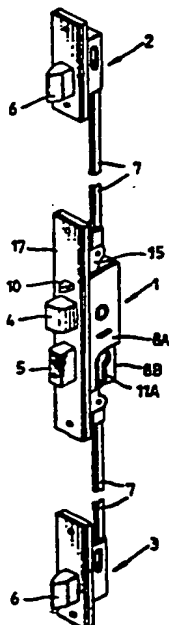


Fig.4

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Fig. 1.

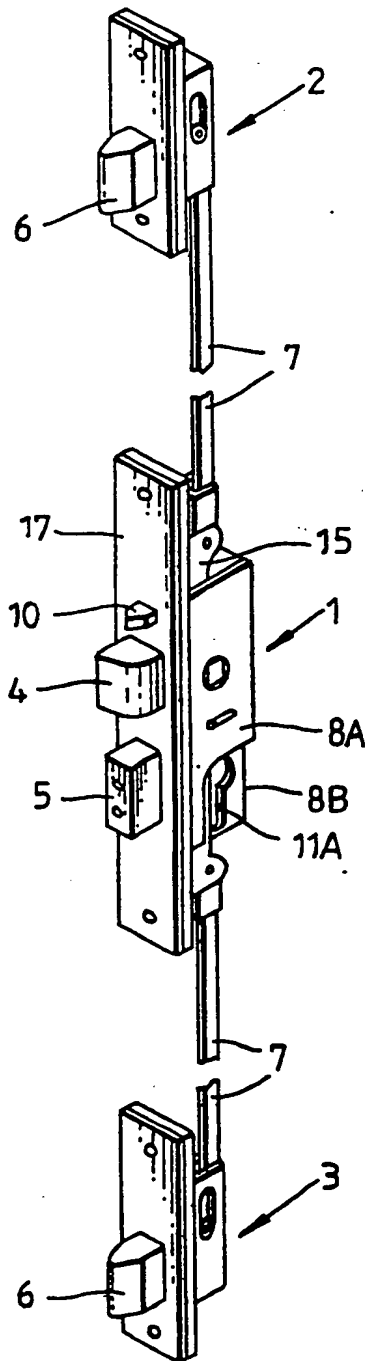
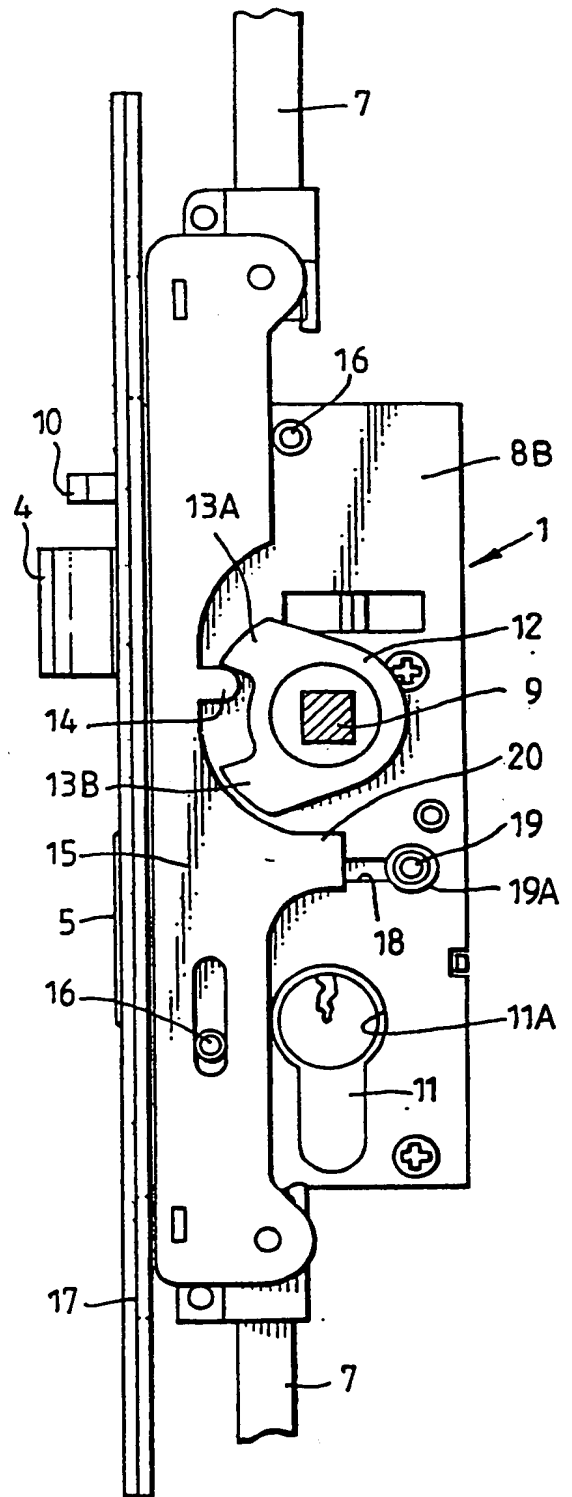


Fig. 2



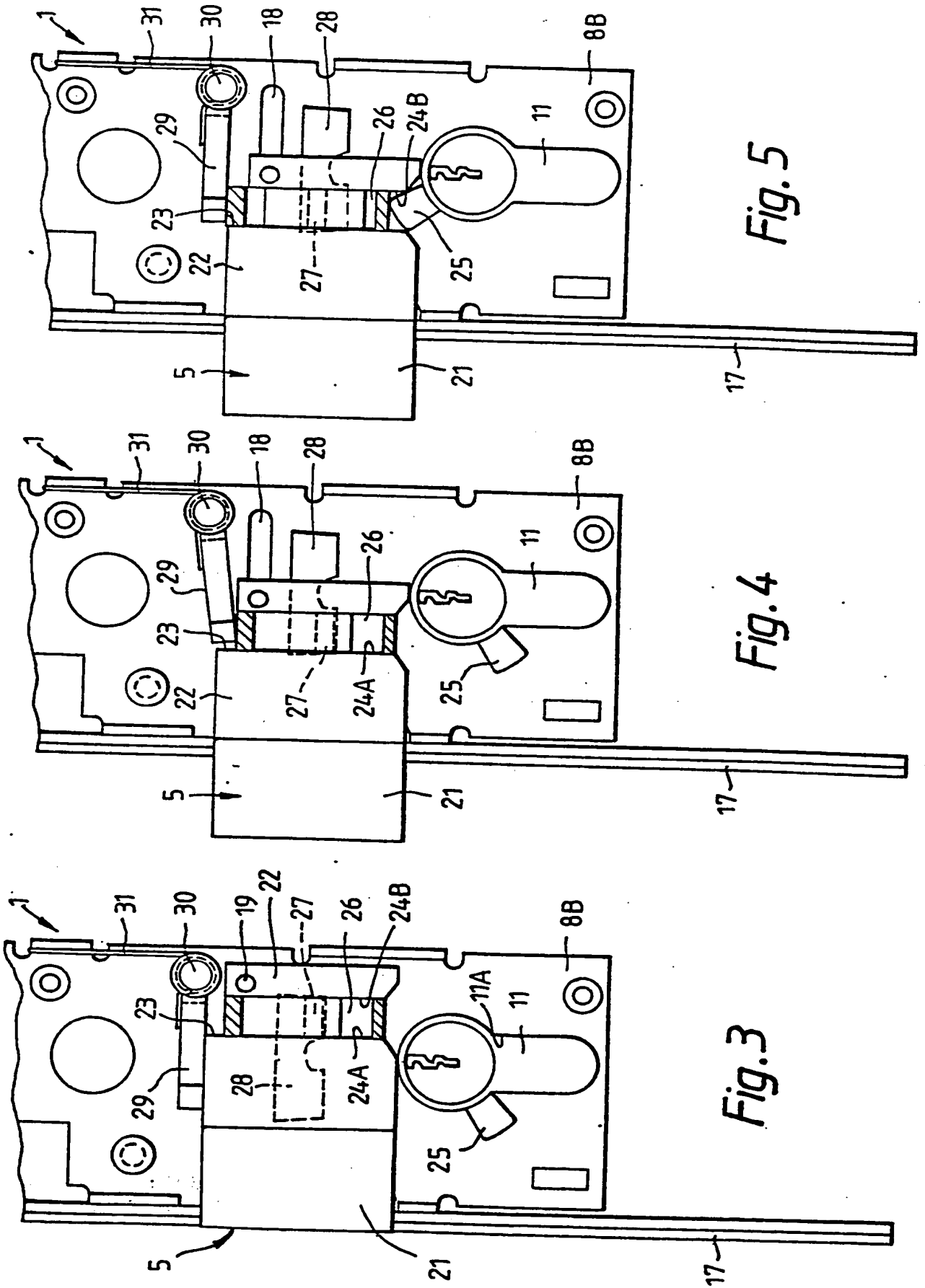


Fig. 5

Fig. 4

Fig. 3

Locks

The present invention relates to locks for doors or other closures and more particularly relates to so-called multi-point locks of the kind comprising: a main lock unit and one or more bolts located remotely from the main lock unit but being operable therefrom through a reciprocable drive linkage; the main lock unit including a main bolt, a key-recognition mechanism through which the main bolt can be thrown and withdrawn by turning a correct key in appropriate senses, and a rotary drive member adapted to be turned by an associated handle or the like manipulable element to reciprocate said drive linkage for throwing and withdrawing said remote bolt(s).

A multi-point lock of this kind is disclosed for example in our United Kingdom patent specifications nos. 2168105 and 2196382. As shown therein, a main deadbolt and an element of the drive linkage for the remote bolt(s) are effectively interlocked so that while the main bolt is thrown the remote bolt(s) are also blocked from being withdrawn. The same key operation is therefore effective to secure all of the bolts. A potential problem which must be addressed with this arrangement, however, is that if the main bolt can be forced back by extreme pressure in an attack upon the lock, the remote bolt(s) are thereby also freed for withdrawal by operation of the associated handle and the security afforded by those bolts is overcome.

- The present invention accordingly seeks to improve the security of a multi-point lock of the kind stated by increasing the resistance of the main bolt to forced retraction. To this end the invention proposes an
- 5 abutment member within the main lock unit which is biased towards a position in which it blocks the main bolt from forced withdrawal when thrown, which is held away from its blocking position when the bolt is withdrawn but is released to move to its blocking position by movement of
- 10 the bolt to its thrown position, and which can be moved away from its blocking position to permit withdrawal of the bolt by turning a correct key in the key-recognition mechanism.
- 15 A preferred embodiment of a multi-point lock in accordance with the invention will now be more particularly described, by way of example, with reference to the accompanying drawings in which:-
- 20 Figure 1 is an isometric view of the entire lock;
- Figure 2 is a side view of the central unit of the lock, with an outer cover plate removed, shown unlocked;
- 25 Figure 3 is a side view of part of the mechanism within the main casing of the central unit, with the main bolt withdrawn;
- Figure 4 is a view similar to Figure 3, with the main bolt
- 30 thrown; and
- Figure 5 is a view similar to Figures 3 and 4, with the main bolt about to be withdrawn.
- 35 The multi-point lock shown in Figure 1 consists essentially of a central unit 1 and upper and lower end units 2 and 3, each intended for installation mortice-wise

into the hollow stile of an aluminium or uPVC door. The central unit 1 (seen also in Figure 2) comprises a lock of generally conventional kind having a spring bolt 4 and dead bolt 5. Each end unit 2 and 3 has a dead bolt 6 the movements of which are controlled from the central unit 1 via respective drive bars 7.

Figure 2 shows the central unit 1 with an outer cover plate (8A in Figure 1) removed. Within the main casing 8B of this unit is mechanism of known kind for withdrawing the spring bolt 4 in response to the turning of a spindle 9 by means of an associated handle (not shown) on each side of the door, and for automatically deadlocking the spring bolt 4 against end pressure when the door is closed, in response to the actuation of a snib 10, and known mechanism for throwing and retracting the dead bolt 5 in response to key-operation of a locking cylinder 11 (not shown in Figure 1) mounted through casing apertures 11A. Alternatively if a so-called "nightlatch" action is required, the spindle 9 will be adapted in known manner to provide that the spring bolt 4 can be retracted by handle movement from the inside of the door only, retraction from the outside requiring key-operation.

As shown in Figure 2, mounted to the spindle 9 outside the casing 8B is a follower 12. This follower has two ears 13A and 13B which can engage alternately with a central drive lug 14 on a plate 15 which is borne for vertical sliding movement on the outside of the casing 8B by means of a pair of pins 16 and the lock forend 17. At each end the plate 15 is connected to the respective drive bars 7 so that by sliding the plate 15 and bars 7 downwards the end unit bolts 6 are both thrown and by sliding the plate 15 and bars 7 upwards the end units bolts 6 are both retracted (by mechanisms in the end units which are described in our United Kingdom patent specification no. 2168105). In order to throw the end unit bolts 6,

therefore, the illustrated follower 12 is turned anti-clockwise in the sense of Figure 2 (that is to say by lifting the associated handle) to drive the lug 14 downwards with the ear 13A, and to retract the end unit bolts 6 that follower 12 is turned clockwise in the sense of Figure 2 (that is to say by depressing the associated handle) to drive the lug 14 upwards with ear 13B. The ears 13A/13B are spaced apart as shown to enable the handle to spring back to a central, horizontal position between each such movement. The assembly of follower 12 and plate 15 is duplicated on the side of the lock opposite to that seen in Figure 2 so that where a "nightlatch" action for the spring bolt 4 is provided as described above - which involves splitting the spindle 9 so that a drive connection is not established through the spindle between the two handles on the opposite sides of the door - throwing and retraction of the bolts 6 will occur by appropriate manipulation of either handle.

As seen in Figure 2, the deadbolt 5 bears a lateral pin 19 which extends out through a slot 18 in the casing 8A and there carries a roller 19A. In the upper position of the plate 15 as shown in Figure 2, which corresponds to the retracted position of the end unit bolts 6, a tongue 20 of the plate 15 lies in the path of the roller 19A and thereby blocks throwing of the deadbolt 5 until after the end bolts 6 have been thrown. Throwing the latter, however, by downward movement of the plate 15, frees the deadbolt 5, and when that bolt has been thrown by appropriate key-operation the roller 19A overlies the tongue 20 to block upward movement of the plate 15 - and thereby retraction of the bolts 6 and turning of the spindle 9 to retract the spring bolt 4 - until after the bolt 5 has been retracted again with the key.

Turning now to Figures 3 to 5, these illustrate the dead bolt operating and locking mechanism within the casing 8B

in different operative conditions, the other components within the casing concerned with the operation of the spring bolt 4 being omitted for clarity.

5 As shown in these Figures, the dead bolt 5 comprises a head portion 21 and a tail portion 22. The head 21 is borne for reciprocation through an aperture in the forend 17 and the tail 22 is guided by engagement of the pin 19 in casing slots 18 (Figs 2, 4 and 5) at each side. The upper surface of the bolt tail is stepped at 23 and its lower surface is provided with the usual talons or drive surfaces 24A, 24B through which the bolt is driven to extend or retract by the rotating thrower or cam 25 of the conventional locking cylinder 11. The bolt tail also carries a detainer 26 with a lateral stump 27 which engages in a racking slot 28 in the far (as illustrated) side of the casing 8B. The slot 28 is formed with two pockets within which the detainer stump 27 can lie to retain the bolt in its extended and retracted positions respectively, the detainer 26 being lifted by the thrower 25 to allow the stump to move from one to the other pocket when the bolt is being extended and retracted, in known manner.

25 In accordance with the invention, the lock also includes a locking bar or lever 29 which is pivoted on a pin 30 above the bolt 5 and biased by a spring 31 in the anti-clockwise sense (as viewed) to rest upon the upper surface of the bolt tail 22. In the bolt-retracted or unlocking condition of Figure 3 the lever 29 rests upon the taller portion of the bolt tail 22 forward of its step 23 and has no influence on the bolt. Throwing of the bolt from this condition involves insertion of a correct key into the cylinder 11 and turning the same through 360° in the anti-clockwise sense (as viewed), to drive the bolt to the position of Figure 4. In so doing the thrower 25 engages the drive surface 24A of the bolt and also lifts the



5        detainer 26 to move its stump 27 from one pocket of the  
10       slot 28 to the other as it is carried forward with the  
15       bolt. Furthermore, as the bolt approaches its fully  
20       extended position the step 23 passes beneath the locking  
25       lever 29 and allows the latter to fall onto the shorter  
30       rear portion of its tail 22, above the detainer 26. In  
35       this condition the lever 29 effectively blocks forced  
40       retraction of the bolt 5. Any excessive end pressure on  
45       the bolt will cause its step 23 to engage the end of the  
50       lever 29 which as shown in Figure 4 is at only a shallow  
55       angle (say not more than about 10°) to the direction of  
60       retraction of the bolt. Force applied to the bolt in an  
65       effort to retract the same in this condition will  
70       therefore be resolved into a major component acting along  
75       the lever 29 to the pin 30 and a minor component acting  
80       anticlockwise (as viewed) on the lever to keep the latter  
85       firmly wedged against the step 23. The strength of the  
90       lever 29 and pin 30 and the fixing of the latter in the  
95       casing 8B can be chosen to securely resist forcing loads  
100      far in excess of those which would be resisted by the  
105      detainer stump 27 in pocket 28 acting alone. As will be  
110      appreciated, so long as the bolt 5 remains extended so  
115      also are the spring bolt 4 and the end unit bolts 6  
120      blocked from being retracted.

125      To retract the bolt 5 from the locking condition of Figure  
130      4 the correct key is inserted into the cylinder 11 and  
135      turned through 360° in the clockwise sense (as viewed).  
140      In so doing the thrower 25 first lifts the detainer 26 as  
145      shown in Figure 5, as is required to enable its stump 27  
150      to pass along the slot 28. In addition, lifting of the  
155      detainer 26 causes the lever 29 to be raised against its  
160      spring bias as also shown in Figure 5, to clear the step  
165      23. Further rotation of the thrower 25 retracts the bolt  
170      through its engagement with drive surface 24B to leave the  
175      mechanism back in the condition of Figure 3, as the  
180      detainer 26 falls once more the lever 29 being released to

lie in its inoperative position upon the taller portion of the bolt tail.

CLAIMS

1. A multi-point lock comprising: a main lock unit and one or more bolts located remotely from the main lock unit but being operable therefrom through a reciprocable drive linkage; the main lock unit including a main bolt, a key-recognition mechanism through which the main bolt can be thrown and withdrawn by turning a correct key in appropriate senses, and a rotary drive member adapted to be turned by an associated manipulable element to reciprocate said drive linkage for throwing and withdrawing said remote bolt(s); the main bolt and an element of the drive linkage being so associated that while the main bolt is thrown the remote bolt(s) are also blocked from being withdrawn through said linkage; and further comprising an abutment member within the main lock unit which is biased towards a position in which it blocks the main bolt from forced withdrawal when thrown, which is held away from its blocking position when the bolt is withdrawn but is released to move to its blocking position by movement of the main bolt to its thrown position, and which can be moved away from its blocking position to permit withdrawal of the bolt by turning a correct key in the key-recognition mechanism.

2. A lock according to claim 1 wherein said abutment member is pivoted about an axis parallel to the turning axes of the key and rotary drive member, and has an end portion which engages a formation on the main bolt to block forced withdrawal of the latter when thrown.

3. A lock according to claim 2 wherein said end portion of the abutment member rests upon a surface of the main bolt to hold that member away from its blocking position when the bolt is withdrawn, and is transferred to said formation of the main bolt by movement under spring bias when the bolt is thrown.

4. A lock according to claim 2 or claim 3 wherein the pivot of the abutment member is at a fixed location in the main lock unit behind said formation of the main bolt and disposed so that the line of action from the end portion  
5 of the abutment member to the pivot when in its blocking position is inclined at an angle of not more than about 10° to the direction of withdrawal of the main bolt.

5. A lock according to any preceding claim wherein the  
10 key recognition mechanism comprises a locking cylinder with a rotatable thrower, the main bolt carries a detainer with an abutment engaging in a profiled slot in the casing of the main lock unit which detainer is lifted by the  
15 thrower to enable its abutment to pass from one part of said slot to another when the main bolt is thrown and withdrawn, and wherein said abutment member engages said  
20 detainer when the main bolt is thrown and is moved away from its blocking position as aforesaid by the lifting of the detainer by the thrower when the main bolt is to be withdrawn.

6. A multi-point lock substantially as hereinbefore described with reference to the accompanying drawings.

- 10 -

**Patents Act 1977**  
**Examiner's report to the Comptroller under**  
**Section 17 (The Search Report)**

Application number  
 GB 9310664.9

**Relevant Technical fields**

(i) UK Cl (Edition L ) E2A (AAK, AAR)

(ii) Int Cl (Edition 5 ) E05B; E05C

**Search Examiner**

P A MAKIN

**Date of Search**

2 AUGUST 1993

**Databases (see over)**

(i) UK Patent Office

(ii)

Documents considered relevant following a search in respect of claims 1-6

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
Y	GB 2242702 A (JOSIAH PARKS) whole document	1
Y	GB 2202267 A (FULLEX) see particularly retainer 55	1, 5
Y	GB 2196382 A (JOSIA PARKS) whole document	1
Y	GB 2168105 A (JOSIAH PARKS) whole document	1

SF2(p)

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Category	Identity of document and relevant passages - 11 -	Relevant to claims

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Fig. 1.

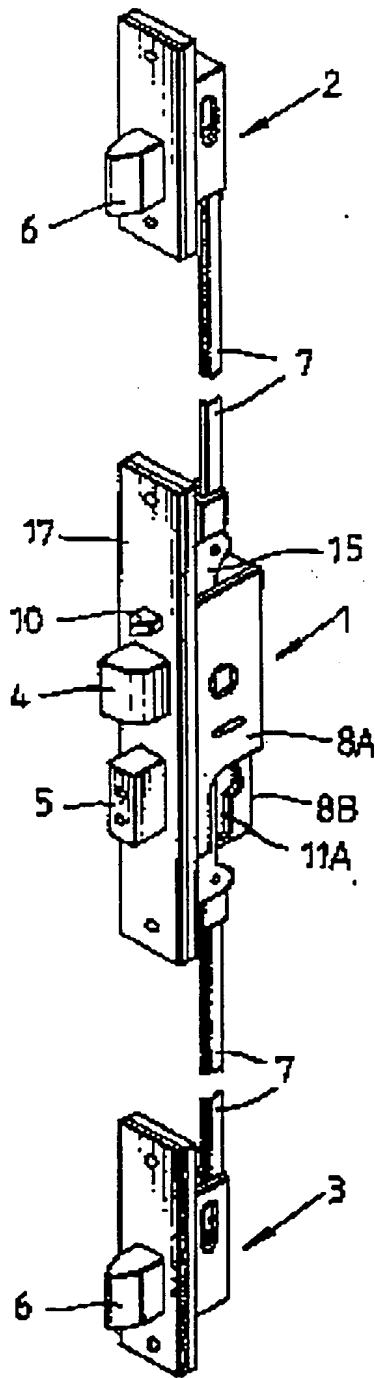
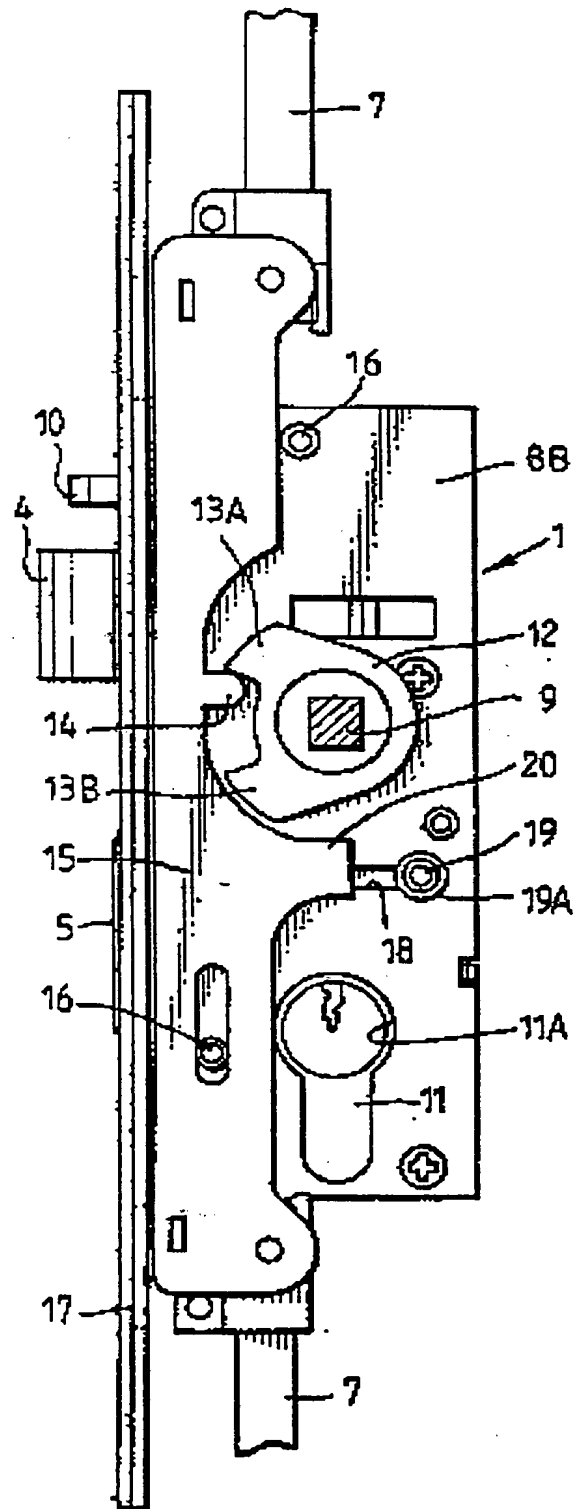


Fig. 2



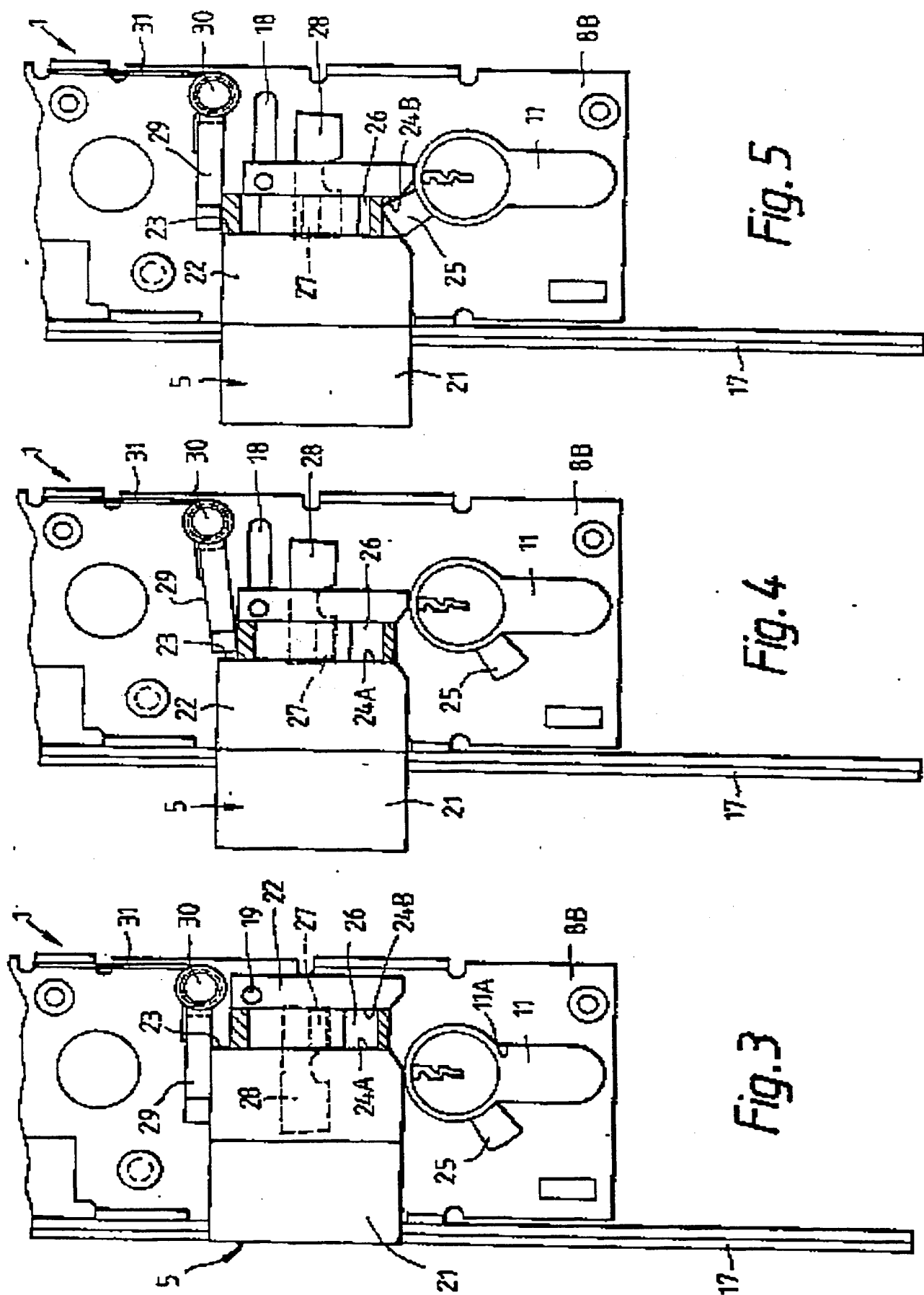


Fig. 5

Fig. 4

Fig. 3